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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,237	03/24/2004	David M. Pepper	B-4856 620360-6	6678

7590 06/10/2005

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EXAMINER	
MILLER, ROSE MARY	

ART UNIT	PAPER NUMBER
2856	

DATE MAILED: 06/10/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/809,237	PEPPER ET AL.	
	Examiner	Art Unit	
	Rose M. Miller	2856	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 November 1204 and 15 April 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-50* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *24 March 2004* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *10/12/04 & 4/15/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to because empty diagram boxes are impermissible under 37 CFR §1.83(a) which recites as follows:

> *"The drawing in a nonprovisional application must show every feature of the invention specified in the claims. However, conventional features disclosed in the description and claims, where their detailed illustration is not essential for a proper understanding of the invention, should be illustrated in the drawing in the form of a graphical drawing symbol or a* ***labeled*** *representation (e.g., a* ***labeled*** *rectangular box)." (Emphasis added by Examiner)*

The empty diagram boxes 110, 120, 130, 140, 150, 310, and 320, found in Figures 1 and 3 of the drawings, must be labeled with an appropriate descriptive phrase in addition to the reference legend all ready present. Appropriate correction is required.

Replacement drawing sheets including the correction are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 1-8, 14-19, 21, 27-34, and 40-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Lorraine et al. (US 5,801,312)** in view of **Beffy et al. (US 5,513,532)**.

Lorraine et al. discloses an ultrasonic imaging system comprising: an exciter disposed to impinge at least one exciter beam (source laser 12) onto a remote mass (14) to excite the mass; an optical probe (detector laser 16) disposed to impinge at least one optical beam onto a vibrating surface of the excited mass (14) to be reflected thereby; a laser vibrometers (detector 18) disposed to detect at least part of the optical beam reflected by the vibrating surface of the excited mass (14) and configured to generate signals indicative of the surface vibrations (signal capture 20); a processor (20) configured to store (memory 24) the signals generated by the laser vibrometer (18).

With regards to claims 1, 2, 14, 27, 28, 40 and 41, **Lorraine et al.** discloses the claimed invention with the exception of the processor being configured to reverse the signals generated by the laser vibrometer and the system including a modulator configured to modulate the at least one exciter beam generated by the exciter in accordance with the reversed signals.

Beffy et al. teaches inverting or time-reversing signals received from a test object and modulating an emitter in accordance with the reversed signals in order to improve the detection of defects within the test object.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Lorraine et al.** with a processor which both stores and reverses the signals received from the vibrometer and a modulator for modulating the exciter beam in accordance with the reversed signals as taught by **Beffy et al.** in order to improve the test results and provide a more accurate indication of flaws within the test object.

With regards to claims 3, 15, 29, and 42, **Lorraine et al.** fails to teach the processor being configured to store the signals as a series of pulses and to reverse the

stored pulses in a first in, last out (FILO) sequence. **Beffy et al.** teaches at column 4 lines 35-44 utilizing a sampler, an analog-digital converter, and a LIFO (last in first out) type memory for storing and reversing the measured signals. It is inherent in the use of a sampler and an analog-digital converter to produce signal pulses from a continuous analog signal. Therefore, as a LIFO memory is a functional equivalent of a FILO memory, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Lorraine et al.** to include the storage of the signals as a series of pulses and to reverse the stored pulses in a first in, last out (FILO) sequence in order to reverse the signals as such is taught by **Beffy et al.** in order to improve the test output.

With regards to claims 4, 16, and 30, **Lorraine et al.** fails to disclose the use of a cache memory to store the signals. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a cache memory for the storage of the signals as cache memories are well known and well utilized throughout the art of measuring and testing when signal storage is needed. Therefore, one of ordinary skill in the art would select the best type of memory, including a cache memory, which meets the requirements of the system while maintaining the level of cost selected for the invention.

With regards to claims 5, 17, 31, and 43, **Lorraine et al.** fails to disclose a programmable delay line network. **Beffy et al.** teaches utilizing a transducer array to test the object under test. It is well known throughout the art of ultrasonic measuring and testing to utilize a programmable delay line network in order to either focus the transmitted wave by delaying application of the transmission signal to each individual transducer or by delaying the signals received by each individual transducer so that signals from a single location can be added together. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Lorraine et al.** with a programmable delay line network in order to focus the ultrasonic waves, either during transmission or after reception, at a particular location within the test object.

With regards to claims 6, 18, and 32, **Lorraine et al.** fails to disclose the use of a cache memory to store the signals. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a cache memory for the storage of the signals as cache memories are well known and well utilized throughout the art of measuring and testing when signal storage is needed. Therefore, one of ordinary skill in the art would select the best type of memory, including a cache memory, which meets the requirements of the system while maintaining the level of cost selected for the invention.

With regards to claims 7, 19, 33, and 44, **Lorraine et al.** fails to disclose the use of a pulsed laser source for impinging onto the remote mass to excite the mass. Pulsed lasers are well known in the art of ultrasonic measuring and testing for exciting a mass or object with a particular frequency. This is partly controlled by controlling the pulse frequency of the laser. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a pulsed laser source for the laser source disclosed in the system of **Lorraine et al.** as such allows for greater control of the frequency and characteristics of the vibrations produced within the excited mass/object.

With regards to claims 8, 21, 34, and 45, **Lorraine et al.** fails to disclose the vibrometer being a compensated laser vibrometer. It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Lorraine et al.** with a compensated laser vibrometer as such are well known throughout the art of ultrasonic measuring and testing for providing a more accurate test result or image by reducing the error signals within the system.

5. Claims 1-9, 14-22, 27-35, and 40-46 are rejected under 35 U.S.C. 103(a) as being obvious over **Pepper et al. (US 6,657,732 B2)** in view of **Beffy et al.** and **Fink (US 5,092,336)**.

The applied reference, **Pepper et al.**, has at lest one common inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a)

might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(l)(1) and § 706.02(l)(2).

Pepper et al. discloses an vibrometer system comprising: an exciter disposed to impinge at least one exciter beam (see column 3 lines 47-65 where the use of both acoustic and laser exciters are disclosed) onto a remote mass (6) to excite the mass; an optical probe (see Figures) disposed to impinge at least one optical beam onto a vibrating surface of the excited mass (6) to be reflected thereby; a laser vibrometers (see Figures) disposed to detect at least part of the optical beam reflected by the vibrating surface of the excited mass (6) and configured to generate signals indicative of the surface vibrations (see Figures).

With regards to claims 1, 2, 14, 27, 28, 40 and 41, **Pepper et al.** discloses the claimed invention with the exception of a processor configured to store and reverse the signals generated by the laser vibrometer and a modulator configured to modulate the at least one exciter beam generated by the exciter in accordance with the reversed signals.

Beffy et al. teaches inverting or time-reversing signals received from a test object and modulating an emitter in accordance with the reversed signals in order to improve the detection of defects within the test object. This can be performed either by the memory circuit disclosed or a solid-state component such as a processor (see column 7 lines 29-48 of **Fink et al.**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Pepper et al.** with a processor which both stores and reverses the signals received from the vibrometer and a modulator for modulating the exciter beam in accordance with the reversed signals as taught by **Beffy et al.** in order determine more accurately an indication of flaws within the test object under test.

With regards to claims 3, 15, 29, and 42, **Pepper et al.** fails to teach the processor being configured to store the signals as a series of pulses and to reverse the stored pulses in a first in, last out (FILO) sequence. **Beffy et al.** teaches at column 4 lines 35-44 utilizing a sampler, an analog-digital converter, and a LIFO (last in first out) type memory for storing and reversing the measured signals. It is inherent in the use of a sampler and an analog-digital converter to produce signal pulses from a continuous analog signal. Therefore, as a LIFO memory is a functional equivalent of a FILO memory, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify **Pepper et al.** to include the storage of the signals as a series of pulses and to reverse the stored pulses in a first in, last out (FILO) sequence in order to reverse the signals as such is taught by **Beffy et al.** in order to improve the detection of a flaw within the test object.

With regards to claims 4, 16, and 30, **Pepper et al.** fails to disclose the use of a cache memory to store the signals. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a cache memory for the storage of the signals as cache memories are well known and well utilized throughout the art of measuring and testing when signal storage is needed. Therefore, one of ordinary skill in the art would select the best type of memory, including a cache memory, which meets the requirements of the system while maintaining the level of cost selected for the invention.

With regards to claims 5, 17, 31, and 43, **Pepper et al.** fails to disclose a programmable delay line network. **Beffy et al.** teaches utilizing a transducer array to test the object under test. It is well known throughout the art of ultrasonic measuring and testing to utilize a programmable delay line network in order to either focus the

transmitted wave by delaying application of the transmission signal to each individual transducer or by delaying the signals received by each individual transducer so that signals from a single location can be added together. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the system of **Pepper et al.** with a programmable delay line network in order to focus the ultrasonic waves, either during transmission or after reception, at a particular location within the test object.

With regards to claims 6, 18, and 32, **Pepper et al.** fails to disclose the use of a cache memory to store the signals. It would have been obvious to one of ordinary skill in the art at the time the invention was made to utilize a cache memory for the storage of the signals as cache memories are well known and well utilized throughout the art of measuring and testing when signal storage is needed. Therefore, one of ordinary skill in the art would select the best type of memory, including a cache memory, which meets the requirements of the system while maintaining the level of cost selected for the invention.

With regards to claims 7, 19, 33, and 44, **Pepper et al.** discloses the use of a pulsed laser source for impinging onto the remote mass to excite the mass (see column 3 lines 47-65).

With regards to claims 8, 21, 34, and 45, **Pepper et al.** discloses the vibrometer being a compensated laser vibrometer in Figure 7.

With regards to claims 9, 20, 22, 35, and 46, **Pepper et al.** discloses an adaptive photodetector for detecting a plurality of speckles from the optical beam reflected by the vibrating surface of the excited mass (see column 2 lines 19-54).

Double Patenting

6. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA

1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

7. Claims 10, 11, 12, 13, 23, 24, 25, 26, 36, 37, 38, 39, 47, 48, 49, and 50 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 60, 60, 69, 70, 60, 60, 69, 70, 60, 60, 69, 70, 51, 51, 58, 54, respectively, of copending Application No. 10/966,698. Although the conflicting claims are not identical, they are not patentably distinct from each other because the use of multiple exciters, one for each of the plurality of vibrometers arrayed, would have been obvious as the multiplication of an element for a multiplied effect (in this case the speed up of the testing of the object) is well known in the art of measuring and testing. Therefore, it would have been obvious to one of ordinary skill in the art to include an exciter for each vibrometer in order to allow for faster testing and better control over the test apparatus.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Penney (US 3,978,713) discloses a laser generation of ultrasonic waves for nondestructive testing.

Constant (US 4,080,660) discloses a digital signal time scale inversion.

Mallart et al. (US 5,276,654) discloses an apparatus for the examination of objects by ultrasonic echography.

Nelson et al. (US 5,982,482) discloses determining the presence of defect in thin film structures.

Drake, JR (US 2003/0029243 A1) discloses a method and apparatus for improving the dynamic range of laser detected ultrasound in attenuative materials.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rose M. Miller whose telephone number is 571-272-2199. The examiner can normally be reached on Monday - Friday, 7:30 am to 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RMM
3 June 2005

HEZRON WILLIAMS
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